



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,054	07/30/2003	Yuemei Yang	3006.001300/KDG	8193

23720 7590 05/04/2006

WILLIAMS, MORGAN & AMERSON  
10333 RICHMOND, SUITE 1100  
HOUSTON, TX 77042

EXAMINER
----------

RAETZSCH, ALVIN T

ART UNIT	PAPER NUMBER
----------	--------------

1754

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

5

<b>Office Action Summary</b>	<b>Application No.</b> 10/630,054	<b>Applicant(s)</b> YANG ET AL.	
	<b>Examiner</b> Alvin T. Raetzsch	<b>Art Unit</b> 1754	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-311 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-311 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### *Drawings*

1. The drawings are objected to because the features/details of figures 5-6 & 13-16 are not viewable. The USPTO scans the drawings in Black & White, and pictures (SEMs, etc) do not show up with any detail when scanned as made. Please resubmit these figures. Changing the contrast and/or brightness of the pictures such that the features show up reasonably well when copied on a copier in black & white (under normal settings) can alleviate the problem.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Rejections*

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 1-16, 20-53, 230-234, 236-246, & 252-291 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Resasco et al. (6,413,487).

Resasco teaches method for producing single-wall carbon nanotubes using a supported bi-metal catalyst of at least one metal from both group VIIIB and VIB. Iron, Co, & Mo are all taught as catalytic metals on MgO (see claim 23). Resasco teaches the claimed ratios of metals, reducing the metal with hydrogen before contacting, and

teaches contacting the catalyst with methane with hydrogen for a short period of time at the claimed temperatures to produce substantially pure single-wall nanotubes, then using HCl to remove the catalyst. While Resasco does not teach the same method of combusting precursors of the catalytic metals, the resulting product appears to be the same. It has been held that the process does not, *per se*, impart patentability of the product (see MPEP § 2113). The burden is upon the applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. Applicant arguments are not a substitute for factual evidence.

With regard to process parameters that are not explicitly taught (reaction time for example), such parameters are known to those of ordinary skill in the art to be optimizable based on the desired product. In addition, Resasco clearly teaches (Column 3 contains one of several examples) that many of the variables can be varied for different products not explicitly taught.

2. Claims 17-20, 78-125, 150-195, & 247-251 are rejected under 35 U.S.C. 103(a) as being unpatentable over Resasco et al. as applied above in view of Smalley et al. (6,761,870).

Resasco does not teach sulfiding the catalyst. Smalley teaches a method of making single-wall carbon nanotubes using the same catalytic metals (bottom of column 3) as catalyst particles, but does not use a support. The nanotube growth step of Smalley is similar to that of Resasco in the use of temperature, feedstock, and resulting purity, among other analogous properties. Smalley teaches using thiophene and H<sub>2</sub>S as sulfiding agents. It would have been obvious to one of ordinary skill in the art to use these agents in the process of Resasco in order to, as Smalley teaches, fine tune the activity of the catalyst (Column 13, first paragraph).

3. Claims 54-77, 126-149, 196-219, 221-229, & 292-311 are rejected under 35 U.S.C. 103(a) as being unpatentable over Resasco et al. & Smalley et al. as applied above, and further in view of Yamada et al. (5,102,647).

Neither Resasco nor Smalley teach using fluidizing aid particles in the reactor. Yamada teaches a process for growing carbon fibers on catalyst particles while using ceramic particles as a fluidizing aid. Yamada teaches several ways of using the particles and teaches removing them separately and recycling them for reuse. Yamada also teaches using a counter-current flow method in the reactor. It would have been obvious for one of ordinary skill in the art at the time of the invention to use the ceramic particles in the processes of Resasco & Smalley in order to detangle the nanotubes and/or improve heat dispersion of the reaction as taught by Yamada, and to use counter-current flow to increase the interaction of the reactants and catalyst particles. The different variations of the claims are obvious variations that one of ordinary skill in the reactor apparatus and fluidizing aid art would recognize as obvious and are not seen as patentably distinct.

#### *Response to Arguments*

4. Applicant's arguments filed 2/15/06 that are directed to issues other than the previous Resasco rejection have been fully considered but they are not persuasive.

Smalley teaches treating the catalyst with a sulfiding agent. The fact that Smalley does not call the process sulfiding is irrelevant. The steps taught by Smalley would result in a sulfided catalyst. In addition, the use of the sulfiding agent *in situ* as the applicant argues is very similar to the applicants use as discussed the present specification.

The examiner agrees that claims 78 & 150 require a catalyst support and that Smalley does not teach such a feature. Smalley does not need to teach this feature because a feature of Smalley is being shown as known in the art and thus usable in other analogous processes such as Resasco, which does teach a support, hence the 103-type rejection of Resasco in view of Smalley. Resasco and Smalley are analogous processes and there would be a reasonable expectation of success by one of skill.


The applicant argues that there is no motivation to combine the reactor features of Yamada with the process of Resasco and that they make different products. The products are different in name, but analogous in that they both are carbon fibers/filaments of very small size. Yamada's fibers are as small as 100 nm in diameter and the fluidizing aid particles as small as 10 microns, which is analogous to the size of many nanotube catalyst particles.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alvin T. Raetzsch whose telephone number is 571-272-8164. The examiner can normally be reached on 9-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ATR

  
WAYNE A. LANGEL  
PRIMARY EXAMINER